

Title	<i>APG Accelerator Systems Preliminary Proposals: Storage Ring</i>			
Project Requestor	Katherine Harkay, Yong-chul Chae, Yuelin Li, Vadim Sajaev, Chun-xi Wang, Marion White			
Date	May 16, 2008			
Group Leader(s)	Katherine Harkay			
Machine or Sector Manager	Louis Emery			
Category	Accelerator R&D			
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*This row is filled in automatically on check in to ICMS. See Note ¹

Description:

Start Year (FY)	FY09	Duration (Yr)	4
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Objectives:

Propose improvements to storage ring that potentially enable APS performance enhancements.

Benefit:

Potential APS performance enhancements.

Risks of Project: See Note ²

Low to medium

Consequences of Not Doing Project: See Note ³

Lose opportunity to improve operations or improve source properties for beamlines.

Cost/Benefit Analysis: See Note ⁴

Benefits to be determined by user science priorities; cannot complete cost/benefit analysis at this time.

Description:

1. Study and implement improvements to storage ring modeling accuracy in support of operations; for example, develop and implement local chromaticity measurement based on response matrix method.
2. Evaluate the ID impedance for longer straights, including the possibility of re-optimizing the lattice or redesigning the ID chambers. Beyond the R&D phase, this effort would be coordinated with AES/MED.
3. Various APS Renewal proposals may require additional space in the ring, such as bunch-by-bunch feedback kickers, SPX HOM-damping cavities, and/or higher harmonic cavities for bunch lengthening/lifetime improvement. Study the feasibility of implementing two-coupler input power on all rf cavities in the near term (for APS Renewal), such that rf cavities can be removed from the straight sections to make space available for the components listed above or other enhancements. Beyond the R&D phase, this effort would be coordinated with ASD/RF. ASD/RF has successfully tested a two-coupler driven cavity in connection with the potential ERL upgrade.
4. Study physics options for redesigning accelerator components experiencing high heating (due to beam-induced wakefields) with higher-current 24-bunch operation. Beyond the R&D phase, this effort would be coordinated with AES/MED.
5. Evaluate the use of higher-gradient srf accelerating cavities in enabling APS performance enhancements. Potential examples include compressing the rf into fewer sectors and gaining straight section space for other important performance enhancements, and increasing the linac energy and potentially improving the Booster performance. Development of and experience with srf for APS Renewal may also have benefits for the long-term APS upgrade. Beyond the R&D phase, this effort would be coordinated with ASD/RF.

See Accelerator Physics Technical Notes: K. Harkay et al., “APS Renewal Plan: Accelerator System Preliminary Proposals,” ASD/APG/2008-02 (Apr 2, 2008); Y.-C. Chae, “Straight Section for Nanfocusing Beam Line,” ASD/APG/2008-01 (Mar 6, 2008); Y.-C. Chae, “Emittance Exchange Beamline Using FODO,” ASD/APG/2008-03 (Mar 19, 2008),

Funding Details

Cost: (\$K)

Use FY08 dollars.

APS Strategic Planning Proposal

Year	AIP	Contingency
1		
2		
3		
4		
5		
6		
7		
8		
9		
Total	0	

Contingency may be in dollars or percent. Enter figure for total project contingency.

Effort: (FTE)

The effort portion need not be filled out in detail by March 28

Year	Mechanical Engineer	Electrical Engineer	Physicist	Software Engineer	Tech	Designer	Post Doc	Total
1								0
2								0
3								0
4								0
5								0
6								0
7								0
8								0
9								0

Notes:

¹ **ICMS.** Check in first revision to ICMS as a *New Check In*. Subsequent revisions should be checked in as revisions to that document i.e. *Check Out* the previous version and *Check In* the new version. Be sure to complete the *Document Date* field on the check in screen.

² **Risk Assessment.** Advise of the potential impact to the facility or operations that may result as a consequence of performing the proposed activity. Example: If the proposed project is undertaken then other systems impacted by the work include ... (If no assessment is appropriate then enter NA.)

³ **Consequence Assessment.** Advise of the potential consequences to the facility or to operations if the proposal is not executed. Example: If the proposed project is not undertaken then ____ may happen to the facility. (If no assessment is appropriate then enter NA.)

⁴ **Cost Benefit Analysis.** Describe cost efficiencies or value of the risk mitigated by the expenditure. Example: Failure to complete this maintenance project will result in increased total costs to the APS for emergency repairs and this investment of ____ will also result in improved reliability of _____. (If no assessment is appropriate then enter NA.)

